Check List the journal of biodiversity data

ANNOTATED LIST OF SPECIES

Check List 17 (3): 827–840
https://doi.org/10.15560/17.3.827

PENSOFT

An updated list of the ichthyofauna of Ipanema National Forest, São Paulo, Brazil

Welber Senteio Smith[1,2,4*], Letícia Halcsik[1], Renata Cassemiro Biagioni[1,3], Lúcio Antônio Stefani Pinheiro[1,4], Marta Severino Stefani[1,2]

1 Laboratório de Ecologia Estrutural e Funcional de Ecossistemas, Universidade Paulista, Sorocaba, SP, Brazil • WSS: welber_smith@uol.com.br • LH: leticia.halcsik@bol.com • RCB: renata_biagioni@hotmail.com • LASP: lucioaspinheiro@gmail.com • MSS: ma_stefani@hotmail.com

2 Programa de Pós-Graduação em Ciências da Engenharia Ambiental, Centro de Recursos Hídricos e Estudos Ambientais, Escola de Engenharia de São Carlos, Universidade de São Paulo, Itirapina, SP, Brazil

3 Programa de Pós-Graduação em Planejamento e Uso de Recursos Renováveis, Universidade Federal de São Carlos, Sorocaba, SP, Brazil

4 Programa de Pós-Graduação em Aquicultura e Pesca, Instituto de Pesca, São Paulo, SP, Brazil

* Corresponding author

Abstract

The Ipanema National Forest has been thoroughly studied in the last 25 years, and 50 species of fish species (47 native and three invasive) were reported in 2013. Intensive inventory work carried out by us between 2012 and 2017 found 39 additional species distributed in five orders and 13 families. Our study provides new data which may help efforts to preserve the Ipanema National Forest.

Keywords

Conservation unit; freshwater fish; inventory; Sorocaba river basin

Academic editor: Pedro Bragança | Received 20 October 2020 | Accepted 12 May 2021 | Published 31 May 2021

Citation: Smith WS, Halcsik L, Biagioni RC, Pinheiro LAS, Stefani MS (2021) An updated list of the ichthyofauna of Ipanema National Forest, São Paulo, Brazil. Check List 17 (3): 827–840. https://doi.org/10.15560/17.3.827

Introduction

Conservation units are important in preservation (Dala-Corte et al. 2009), protecting and delimiting high biodiversity areas that require protection. The reduction of natural habitats by anthropization is one of the main reasons of biodiversity loss, including freshwater fish diversity (Cetra et al. 2010), but conservation units have a central role in providing shelter and on keeping habitat diversity, critical aspects in the survival of species. In Ipanema National Forest, a national conservation unit created in 1992 (Smith and Regalado 2008), various lentic and lotic environments can be found that provide conditions for the maintenance of the ichthyofauna. Although protected areas serve to preserve biodiversity by the preservation of habitats, there is still a lack of information about this conservation area, especially regarding aquatic ecosystems (Casarim et al. 2020).

Smith et al. (2013) provided a preliminary checklist of fish species of Ipanema National Forest based on previous reports by Smith (1999), Smith and Marciano (2000) in particular, as well as studies that were part of the Ipanema National Forest Management Plan in 2003 (Brazil, 2003) and the studies of Smith (2003), Smith et

©The authors. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

al. (2007), Smith and Regalado (2008), and Smith et al. (2009). These sources list a total of 50 species distributed in seven orders, 21 families, and 41 genera of fishes living on Ferro Stream and Verde River, in one stretch of the Ipanema River (dam and downstream the dam), in the Hedberg Reservoir, in the Limão and Cobra lagoons and in other lagoons that occur in the conservation unit. The goal of our study was to add to the extensive information on the ichthyofauna of Ipanema National Fore by sampling new locations and recording additional species with experimental fishing techniques and by consulting more recent publications.

Study Site

Ipanema National Forest has an area of 5,180 ha (approximately 23°25′S, 047°37′W at its center). It encompasses the municipalities of Iperó, Araçoiaba da Serra, and Capela do Alto in southeastern São Paulo state, 125 km far from the capital, São Paulo (Fig. 1).

Methods

Samples were collected from 2012 to 2017 in various water bodies using active capture methods: cast nets, trawl nets, hand nets, and a fishing rod with hooks (Table 1). The collections were made under permit from Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio 43596-1). The specimens captured were euthanized in eugenol, fixed in 10% formalin, and preserved in 70% alcohol. Species were identified using available literature, keys, and the help of specialists. Voucher specimens were deposited at the Ichthyology Collection of the Fish Department of the Museu de Zoologia da Universidade de São Paulo (MZUSP) (Appendix) and the Laboratory of Structural and Functional Ecology of Ecosystems of the Universidade Paulista, Sorocaba Campus (LEEF). An extensive bibliographical review was carried out to verify the publication of ichthyological data in Ipanema National Forest since 2013.

Results

In this study, we added 39 species in addition to those already recorded in previous studies, resulting in a total of 89 species for Ipanema National Forest. The 39 species recorded here for the first time are distributed in five orders and 13 families. The taxonomic list of identified species is shown in Table 2, and the newly recorded species are shown in Figure 2. Most of these species belong to the orders Characiformes (23 species) and Siluriformes (10 species). The most diverse families were the Characidae and Loricariidae with 13 and six species, respectively.

Non-native species found in the area are concentrated in lentic habitats (Hedberg reservoir and Cobra

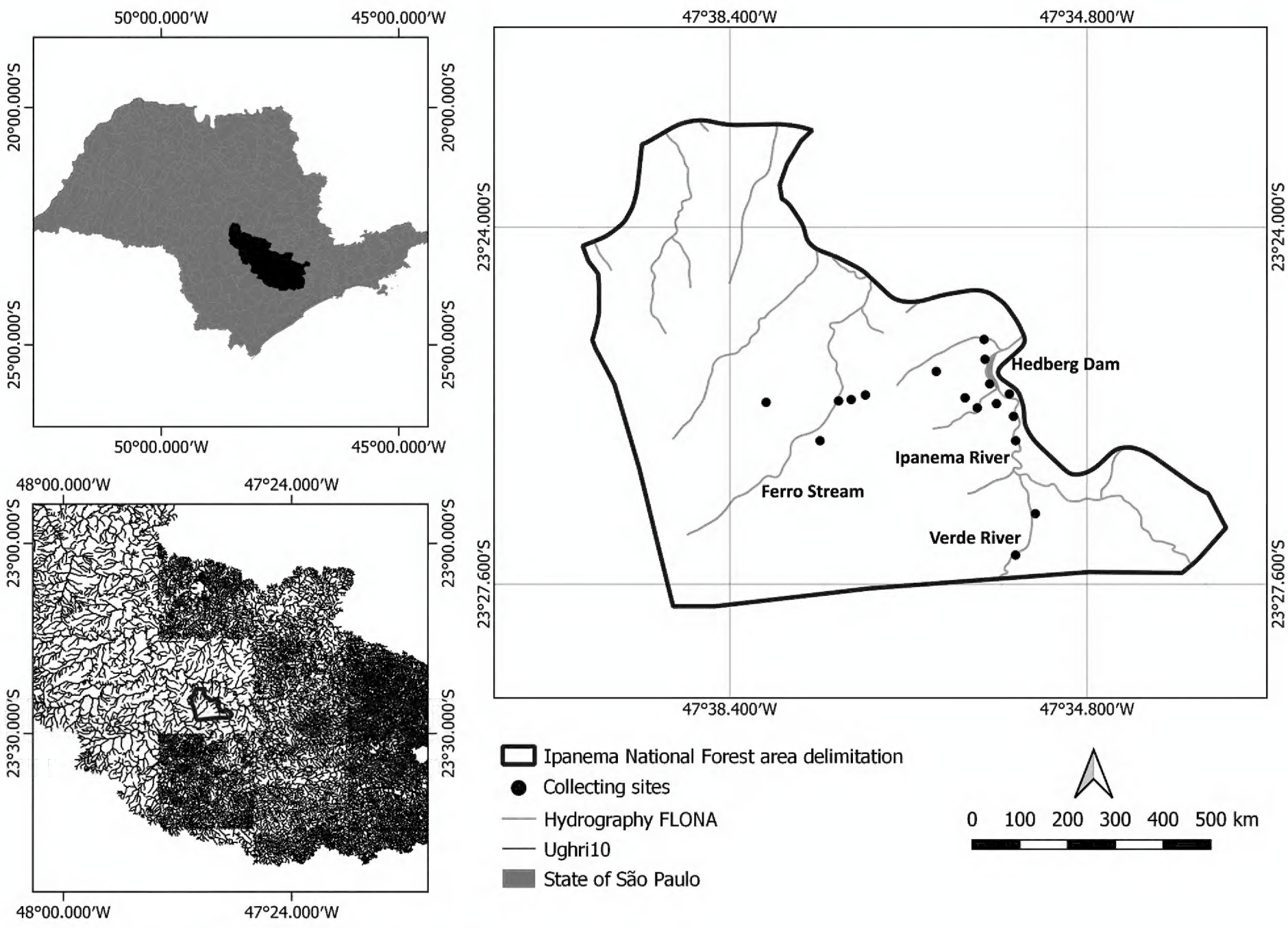

Figure 1. Hydrographic system of Ipanema National Forest and sites sampled.

Table 1. Stations sampled in Ipanema National Forest.

Sites	Locality	Geographic coordinates	Environment	Capture Method
Ip01	Ipanema River (downstream)	23°22.40′S, 049°38.51′W	Lotic	Trawl nets, hand nets
Ip02	Ipanema River (upstream)	23°22.40′S, 049°38.51′W	Lotic	Trawl nets, hand nets
Ip03	Cobra Lagoon	23°26.37′S, 047°38.20′W	Lentic	Cast nets, fishing rod with hooks
Ip04	Hedberg Dam (margin)	23°25.32′S, 047°35.41′W	Lentic	Cast nets, fishing rod with hooks
Ip05	Hedberg Dam (medium)	23°25.40′S, 047°35.30′W	Lentic	Cast nets, fishing rod with hooks
Ip06	Verde River	23°27.18′S, 047°35.31′W	Lotic	Cast nets, fishing rod with hooks
Ip07	Hedberg Dam (flooded area)	23°25.48′S, 047°35.55′W	Lentic	Cast nets, fishing rod with hooks
Ip08	Hedberg Dam	23°25.46′S, 047°35.54′W	Lentic	Cast nets, fishing rod with hooks
Ip09	Limão Lagoon	23°25.27′S, 047°36.19′W	Lentic	Cast nets, fishing rod with hooks
Ip10	Administração Lagoon	23°25.46′S, 047°36.02′W	Lentic	Cast nets, fishing rod with hooks
Ip11	Abacateiro Lagoon	23°27.02′S, 047°35.49′W	Lentic	Cast nets, fishing rod with hooks
Ip12	Ferro Stream	23°26.23′S, 047°37.51′W	Lotic	Trawl nets, hand nets
Ip13	Ferro Stream	23°25.53′S, 047°37.20′W	Lotic	Trawl nets, hand nets
Ip14	Ferro Stream	23°25.51′S, 047°37.21′W	Lotic	Trawl nets, hand nets
Ip15	Verde River	23°26.35′S, 047°35.28′W	Lotic	Trawl nets, hand nets
Ip16	Ipanema River (upstream)	23°25.38′S, 047°28.36′W	Lotic	Trawl nets, hand nets
Ip17	Pedreira	23°25.44′S, 047°38.04′W	Lentic	Trawl nets, hand nets

Table 2. Taxonomic list of fish species from the Ipanema National Forest.

Order, family	Species	Oliveira et al. 2013	Smith et al. 2013	New records	Voucher
CHARACIFORMES					
Acestrorhynchidae					
	Acestrorhynchus lacustris (Lütken, 1875)			X	MZUSP 115236
Anostomidae					
	Leporinus friderici (Bloch, 1794)	X			
	Leporinus striatus Kner, 1858		X		
	Megaleporinus obtusidens (Valenciennes, 1837)	X			
	Schizodon nasutus Kner, 1858	X			
Bryconidae					
	Brycon amazonicus (Agassiz, 1829) †		X		
Characidae					
	Astyanax lacustris (Lütken, 1875)			X	LEEF 15132, 115147, 115156, 1115167
	Bryconamericus iheringii (Boulenger, 1887)			X	LEEF 110611-4
	Cheirodon stenodon Eigenmann, 1915			X	LEEF 110611-3
	Hemigrammus marginatus Ellis, 1911			X	LEEF 115131, 115139
	Hyphessobrycon bifasciatus Ellis, 1911			X	LEEF 115133, 115138, 115162
	Odontostilbe microcephala Eigenmann, 1907		X		
	Oligosarcus pintoi Campos, 1945		X		
	Piabarchus stramineus (Eigenmann, 1908)			X	LEEF 115129, 115155, 115157
	Piabina argentea Reinhardt, 1867			X	LEEF 140122
	Planaltina britskii Menezes, Weitzman & Burns, 2003			X	LEEF 121112
	Psalidodon anisitsi (Eigenmann, 1907)			X	LEEF 121114
	Psalidodon bockmanni (Vari & Castro, 2007)			X	LEEF 115151
	Psalidodon fasciatus (Cuvier, 1819)			X	LEEF 13013
	Psalidodon paranae (Eigenmann, 1914)			X	LEEF 115136, 115149
	Psalidodon eigenmanniorum (Cope, 1894)		X		
	Psalidodon schubarti (Britski, 1964)			X	LEEF 130930
	Salminus hilarii Valenciennes, 1850	X	X		
	Serrapinnus heterodon (Eigenmann, 1915)	X	X		
	Serrapinnus notomelas (Eigenmann, 1915)			X	MZUSP 115241
Crenuchidae					
	Characidium zebra Eigenmann, 1909			X	LEEF 115145, 115164
Curimatidae					
	Cyphocharax gillii (Eigenmann & Kennedy, 1903)			X	LEEF 140731
	Cyphocharax modestus (Fernández-Yépez, 1948)			X	MZUSP 115235
	Steindachnerina insculpta (Fernández-Yépez, 1948)			X	MZUSP 115238
Erythrinidae					
	Hoplias malabaricus (Block, 1794)			X	LEEF 115143, 115168, MZUSP 115230

Order, family	Species	Oliveira et al. 2013	Smith et al. 2013	New records	Voucher
Serrasalmidae					
	Serrasalmus maculatus Kner, 1858	X			
	Piaractus mesopotamicus (Holmberg, 1887) †		X		
Parodontidae					
	Apareiodon affinis (Steindachner, 1879)		X		
	Apareiodon piracicabae (Eigenmann, 1907)			X	LEEF 115160
	Parodon nasus Kner, 1859			X	LEEF 115130
Prochilodontidae					
	Prochilodus lineatus (Valenciennes, 1837)			X	MZUSP 115270
	Prochilodus vimboides Kner, 1859		X		
Triportheidae					
	Triportheus nematurus (Kner, 1858) †		X		
CYPRINIFORMES					
Cyprinidae					
	Cyprinus carpio Linnaeus, 1758 †		X		
GYMNOTIFORMES					
Sternopygidae					
	Eigenmannia aff. *virescens* (Valenciennes, 1836)	X			
Gymnotidae					
	Gymnotus carapo Linnaeus, 1758			X	LEEF 115128, 115141
SILURIFORMES					
Auchenipteridae					
	Tatia neivai (Ihering, 1930)	X			
Aspredinidae					
	Bunocephalus larai Ihering, 1930	X			
Callichthyidae					
	Corydoras aeneus (Gill, 1858)	X			
	Corydoras flaveolus Ihering, 1911			X	MZUSP 115227
	Hoplosternum littorale (Hancock, 1828)				
Cetopsidae					
	Cetopsis gobioides Kner, 1858		X		
Clariidae					
	Clarias gariepinus (Burchell, 1822) †		X		
Pimelodidae					
	Iheringichthys syi Azpelicueta & Britski, 2012		X		
	Pimelodus maculatus La Cèpede, 1803		X		
Heptapteridae					
	Imparfinis mirini Haseman, 1911			X	MZUSP 115244
	Imparfinis schubarti (Gomes, 1956)	X			
	Pimelodella meeki Eigenmann, 1910			X	LEEF 115166, 115175
	Pimelodella rudolphi Miranda-Ribeiro, 1918		X		
	Rhamdia quelen (Quoy & Gaimard, 1824)	X	X		
Pseudopimelodidae					
	Pseudopimelodus mangurus (Valenciennes, 1835)	X			
	Microglanis garavelloi Shibatta & Benine, 2005	X	X		
Trichomycteridae					
	Cambeva iheringi (Eigenmann, 1917)		X		
	Paravandellia oxyptera Miranda Ribeiro, 1912			X	LEEF 115174
Loricariidae					
	Hisonotus depressicauda (Miranda-Ribeiro, 1918)			X	LEEF 115146, 115171
	Hypostomus ancistroides (Ihering, 1911)			X	LEEF 115144, 115159
	Hypostomus hermanni (Ihering, 1905)	X			
	Hypostomus margaritifer (Regan, 1908)		X		
	Hypostomus regani (Ihering, 1905)			X	LEEF 140732
	Hypostomus sp.	X			
	Hypostomus strigaticeps (Regan, 1908)			X	LEEF 151581
	Pterygoplichthys ambrosettii (Holmberg, 1893) †			X	LEEF 151581
	Rineloricaria latirostris (Boulenger, 1900)			X	LEEF 115127
	Rineloricaria sp.		X		

Order, family	Species	Oliveira et al. 2013	Smith et al. 2013	New records	Voucher
CICHLIFORMES					
Cichlidae					
	Geophagus brasiliensis (Quoy and Gaimard, 1824)			X	LEEF 115137, 115163
	Oreochromis niloticus (Linnaeus, 1758) †			X	LEEF 140319
	Coptodon rendalli (Boulenger, 1897) †			X	MZUSP 115233
CYPRINODONTIFORMES					
Poeciliidae					
	Phalloceros harpagos Lucinda, 2008			X	LEEF 120804-1
	Poecilia reticulata Peters, 1859 †			X	LEEF 130929
	Poecilia vivipara Block and Schneider, 1801†	X	X		
SYNBRANCHIFORMES					
Synbranchidae					
	Synbranchus marmoratus Bloch, 1795		X		

† Non-native species.
§ Endangered species according to Oyakawa et al. (2009).

lagoon), except for *Coptodon rendalli* (Boulenger, 1897), which is widely distributed in the numerous water bodies. The national forest includes species with migratory habits, parental care, and internal fertilization (Table 3). The feeding habits of the species in Ipanema National Forest are predominantly omnivorous and insectivorous. Other features and details of the distribution of species are included in Table 3. The more common species in rivers, including Verde and Ipanema rivers, are *Geophagus brasiliensis* (Quoy & Gaimard, 1824) (cará), *Astyanax lacustris* (Lütken, 1875) and *Psalidodon fasciatus* (Cuvier, 1819) (lambaris), *Cyphocharax modestus* (Fernández-Yépez, 1948) and *Steindachnerina insculpta* (Fernández-Yépez, 1948) (saguirú), *Acestrorhynchus lacustris* (Lütken, 1875) (peixe-cadela), and *Phalloceros harpagos* Lucinda, 2008 (guarú).

Order Characiformes
Family Acestrorhynchidae

***Acestrorhynchus lacustris* (Lütken, 1875)**
Figure 2A

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River; 23°26.35′S, 047°35.28′W; 560 m alt.; 15.VI. 2016; W.S. Smith and L. Halcsik leg.; cast nets; MZUSP 115236 (15 spec., 120.0–230.0 mm SL).

Identification. Body elongated; elongated snout; mouth terminal; rounded humeral stem; elongated humeral spot in the rays of the caudal fin; yellowish fins (Ota et al. 2018).

Family Characidae

***Astyanax lacustris* (Lütken, 1875)**
Figure 2B

Material examined. BRAZIL – **São Paulo** • Iperó, Hedberg Dam; 23°25.46′S, 047°35.54′W; 550 m alt.; 12. II.2012; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 15132, 115147, LEEF 115156, LEEF 1115167 (18 spec., 90.0–130.5 mm SL).

Identification. Body deep and high; mouth terminal; inner row of premaxilla with 5 teeth, outer row with 4 or 5, dentary with 8–16, no maxillary teeth. Lateral line complete, with 34–36 scales; transversal series above lateral line with 7–7½ scale rows and below with 6–6½ scale rows. Dorsal fin with 10 rays, pectoral fin with 12 or 13 rays, pelvic fin with 9 rays, anal fin with 25–27 rays, and caudal fin with 19 rays. Ground color silvery; one black rounded humeral blotch followed by another vertically elongated humeral blotch to median caudal-fin rays. Yellowish fins (Graça and Pavanelli 2007; Ota et al. 2018).

***Bryconamericus iheringii* (Boulenger, 1887)**

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River, 23°26.35′S, 047°35.28′W; 560 m alt.; 12.VI. 2013; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 110611-4 (8 spec., 21.0–230.0 mm SL).

Identification. Body high and laterally compressed; premaxilla with two rows of teeth; outer row with three to six teeth; cycloid scales regularly imbricated; lateral line slightly curved; greatest body depth anterior to dorsal fin origin (Tatsumi 2006).

***Cheirodon stenodon* Eigenmann, 1915**

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River, 23°27.18′S, 047°35.31′W; 560 m alt.; 11.VI.2013; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 110611-3 (5 spec., 21.0–22.0 mm SL).

Identification. Body elongated; mouth terminal; premaxilla with 5 teeth, dentary with 8-13 and maxilla with 1 tooth. Lateral line incompletely pored, with 30–34 scales; transversal series above lateral line with 4 scale rows and below with 3 scale rows. Dorsal fin with 7 rays, pectoral fin with 7–9, pelvic fin with 7, anal fin with 18–20 rays and caudal fin with 23 rays. Black spot covering only the medial portion of the base of the caudal fin (Castro et al. 2004).

***Hemigrammus marginatus* Ellis, 1911**
Figure 2C

Table 3. Fish species occurring in the Ipanema National Forest, with their characteristics according to Cardone et al. (2006), Castro et al. (2004), Gomiero and Goitein (2008), Latini et al. (2016), Marçal (2009), Meschiatti and Arcifa (2009), Oliveira et al. (2013), Shibatta and Orsi (2002) and Resende et al. (2016).

Species	Common name	Feeding habitat	Reproduction
Acestrorhynchus lacustris	cadela	Piscivorous	External fertilization, without parental care, non-migratory
Apareiodon affinis	canivete	Detritivore	External fertilization, without parental care, non-migratory
Apareiodon piracicabae ‡	canivete	Detritivore	External fertilization, without parental care, non-migratory
Psalidodon bockmanni	lambari	Omnivorous	External fertilization, without parental care, non-migratory
Psalidodon fasciatus	lambari do rabo vermelho	Omnivorous	External fertilization, without parental care
Astyanax lacustris	lambari	Omnivorous	External fertilization, without parental care, non-migratory
Brycon amazonicus †	matrinxã	Omnivorous	External fertilization, parental care, non-migratory
Bryconamericus iheringii	lambari	Detritivore	External fertilization, without parental care, non-migratory
Bunocephalus larai ‡§	peixe-banjo	–	–
Cambeva iheringi	sobe-serra	Insectivorous	External fertilization, without parental care, non-migratory
Cetopsis gobioides	candiru	Insectivorous	External fertilization, without parental care, non-migratory
Characidium zebra	canivete	Insectivorous	External fertilization, without parental care, non-migratory
Cheirodon stenodon	pequira	Detritivore	External fertilization, without parental care, migratory
Cichlasoma paranaense ‡	acará	Omnivorous	External fertilization
Clarias gariepinus †	bagre africano	Omnivorous	External fertilization, without parental care, migratory
Coptodon rendalli †	tilápia	Herbivore	External fertilization, without parental care, migratory
Corydoras aeneus	ronquinha	Omnivorous	External fertilization, without parental care, non-migratory
Corydoras flaveolus	ronquinha	Omnivorous	External fertilization, without parental care, non-migratory
Cyphocharax gillii	curimba	Detritivore	External fertilization, without parental care, non-migratory
Cyphocharax modestus	saguirú	Iliophage	External fertilization, without parental care, non-migratory
Cyprinus carpio †	carpa	Herbivore / detritivore / zoobenthic	External fertilization, without parental care, non-migratory
Eigenmannia aff. *virescens* ‡	tuvira	Insectivorous	External fertilization, without parental care, non-migratory
Geophagus brasiliensis	cará	Omnivorous	External fertilization, parental care, non-migratory
Gymnotus carapo	tuvira	Carnivore	External fertilization, parental care, non-migratory
Hemigrammus marginatus	piaba	Omnivorous	External fertilization, without parental care, non-migratory
Hisonotus depressicauda	limpa-vidro	Detritivore	External fertilization, without parental care, non-migratory
Hoplias malabaricus	traíra	Carnivore	External fertilization, without parental care, non-migratory
Hoplosternum littorale	caborja	Omnivorous	External fertilization, parental care
Hyphessobrycon bifasciatus	tetra	Herbivore	External fertilization, without parental care
Hypostomus ancistroides	cascudo	Herbivore / detritivore	External fertilization, parental care, non-migratory
Hypostomus hermanni ‡	cascudo	Herbivore / detritivore	External fertilization, without parental care, non-migratory
Hypostomus margaritifer	cascudo	Herbivore / detritivore	External fertilization, without parental care, non-migratory
Hypostomus regani	acari	Herbivore / detritivore	External fertilization, non-migratory
Hypostomus sp.	cascudo	Herbivore / detritivore	External fertilization, without parental care, non-migratory
Hypostomus strigaticeps ‡	cascudo-pintado	Herbivore / detritivore	External fertilization, parental care, non-migratory
Iheringichthys syi	mandi	Carnivore, insectivorous	External fertilization, without parental care, non-migratory
Imparfinis mirini	bagrinho	Insectivorous	External fertilization, parental care, non-migratory
Imparfinis schubarti ‡	bagrinho	Insectivorous	External fertilization, without parental care, non-migratory
Leporinus friderici ‡	piau	Omnivorous	External fertilization, without parental care, migratory
Leporinus striatus ‡	canivete	Omnivorous	External fertilization, without parental care, migratory
Megaloporinus obtusidens	piava	Herbivore	External fertilization, without parental care, migratory
Microglanis garavelloi	bagrinho	Insectivorous	External fertilization, non-migratory
Odontostilbe microcephala	pequira	Omnivorous	External fertilization, without parental care, non-migratory
Oligosarcus pintoi	peixe-cachorro	Carnivore	External fertilization, without parental care, non-migratory
Oreochromis niloticus †	tilápia	Detritivore	External fertilization, parental care, migratory
Paravandellia oxyptera	candiru	Hematophagous	External fertilization, without parental care, non-migratory
Parodon nasus	canivete	Oligophagus	External fertilization, without parental care, non-migratory
Phalloceros harpagos	barrigudinho	Detritivore	internal fertilization, não migratória
Piabarchus stramineus	pequira	Omnivorous	External fertilization, without parental care, non-migratory
Piabina argentea	piaba	Insectivorous	External fertilization, without parental care, migratory
Piaractus mesopotamicus †	pacu	Herbivore	External fertilization, without parental care, migratory
Pimelodella meeki	mandi	Omnivorous	External fertilization, without parental care, non-migratory
Pimelodella rudolphi	mandizinho	Insectivorous	External fertilization, without parental care, non-migratory
Pimelodus maculatus	mandi-pintado	Insectivorous	External fertilization, without parental care, non-migratory
Planaltina britskii	piaba	–	–
Poecilia reticulata †	lebiste	Omnivorous	internal fertilization, without parental care, non-migratory
Poecilia vivipara †	barrigudinho	Omnivorous	internal fertilization, non-migratory
Prochilodus lineatus	curimbatá	Oligophagus	External fertilization, without parental care, migratory
Prochilodus vimboides §	curimbatá	Oligophagus	External fertilization, without parental care, migratory

Species	Common name	Feeding habitat	Reproduction
Psalidodon anisitsi	tetra	Insectivorous / herbivore	External fertilization, without parental care
Psalidodon paranae	lambari	Insectivorous	External fertilization, without parental care, non-migratory
Psalidodon cf. *schubarti*	lambari do rabo amarelo	Insectivorous / herbivore	External fertilization, migratory
Psalidodon eigenmanniorum	lambari	Insectivorous	External fertilization, without parental care, non-migratory
Pseudopimelodus mangurus ‡§	bagre-sapo	Insectivorous	External fertilization
Pterygoplichthys ambrosettii †	cascudo	Herbivore / detritivore	External fertilization, without parental care, non-migratory
Rhamdia quelen	bagre	Omnivorous	External fertilization, parental care, non-migratory
Rineloricaria latirostris	cascudo	Detritivore	External fertilization, without parental care, non-migratory
Rineloricaria sp.	cascudo	Detritivore	External fertilization, without parental care, non-migratory
Salminus hilarii	tabarana	Carnivore	External fertilization, without parental care, migratory
Schizodon nasutus ‡	taguara	Herbivore	External fertilization, without parental care, non-migratory
Serrapinnus heterodon ‡	pequira	Omnivorous	External fertilization, without parental care, non-migratory
Serrapinnus notomelas	piaba	Omnivorous	External fertilization, without parental care, non-migratory
Serrasalmus maculatus ‡	pirambeba	Piscivorous	External fertilization, parental care, non-migratory
Steindachnerina insculpta	saguirú	Iliophage	External fertilization, without parental care, non-migratory
Synbranchus marmoratus	mussum	Carnivore	External fertilization, non-migratory
Tatia neivai ‡	bagrinho	Omnivorous	Non-migratory
Triportheus nematurus †	sardinha	Insectivorous	External fertilization, without parental care, migratory

† Non-native species.
‡ Collected by Oliveira et al (2013).
§ Endangered species according to Oyakawa et al. 2009.
– Information not available in the literature.

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt.; 10.I.2014; W.S. Smith and L. Halcsik leg.; trawl nets; LEEF 115131, LEEF 115139 (15 spec., 10.0–22.0 mm SL).

Identification. Body elongated; mouth subterminal; Premaxillary with five teeth in the inner row and with regular arrangement of the teeth of the outer row; Yellow caudal fin with black stripe in the middle of caudal penducle (Castro et al. 2004).

Hyphessobrycon bifasciatus Ellis, 1911

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt.; 12.II.2012; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 115133, LEEF 115138, LEEF 115162 (12 spec., 22.0–33.0 mm SL).

Identification. Bare caudal fin with scales presents only at the base; Body with two humeral macules and small black spots lying at the height of the lateral line (Yoshida et al. 2016).

Piabarchus stramineus (Eigenmann, 1908)

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt.; 08.II.2016; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 115129, LEEF 115155, LEEF 115157 (5 spec., 25.0–37.0 mm SL).

Identification. Body deep; mouth terminal; premaxillary teeth in two rows; lateral line complete with 39–41 scales; dark stripe in caudal-fin; dorsal, pectoral, pelvic, anal, and caudal fins hyaline; adipose fin and margins of caudal-fin lobes yellowish. (Reia et al., 2020).

Piabina argentea Reinhardt, 1867

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt.; 15.VI.2016; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 140122 (12 spec., 23.0–55.0 mm SL).

Identification. Body elongated; mouth subterminal; outer row of premaxilla with 2 or 3 teeth, median row with 2 and inner row with 4, dentary with 6 or 7 and maxilla with 2 or 3 teeth. Lateral line complete, with 37–40 pored scales; transversal series above lateral line with 5 or 5½ scales above and below with 3 or 3½ scale rows. Dorsal fin with 10 rays, pectoral fin with 15–17, pelvic fin with 8, anal with 17–21, and caudal fin with 19 rays. Ground color silvery to pale yellow; black humeral spot (Graça and Pavanelli 2007; Ota et al. 2018).

Planaltina britskii Menezes, Weitzman & Burns, 2003

Figure 2D

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt.; 10.II.2012, W.S. Smith and L. Halcsik leg.; trawl nets; LEEF 121112 (11 spec., 25.0–34.0 mm SL).

Identification. Body elongated; mouth terminal; outer row of premaxilla with 3 teeth, inner row with 4, dentary with 6 or 7 and maxilla with 2 teeth. Lateral line complete, with 37–40 pored scales; transverse series above lateral line with 5 or 5 ½ scales above and below with 3 or 3½ scale rows. Dorsal fin with 10 rays, pectoral fin with 10–12, pelvic fin with 8, anal with 17–21, and caudal fin with 22 rays. Ground color silvery to pale yellow; dark-brown longitudinal stripe from humeral region to caudal fin, forming spot on base of median rays (Graça and Pavanelli 2007; Ota et al. 2018).

Psalidodon anisitsi (Eigenmann, 1907)

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River, 23°27.18′S, 047°35.31′W; 570 m alt.; 10.II.2012;

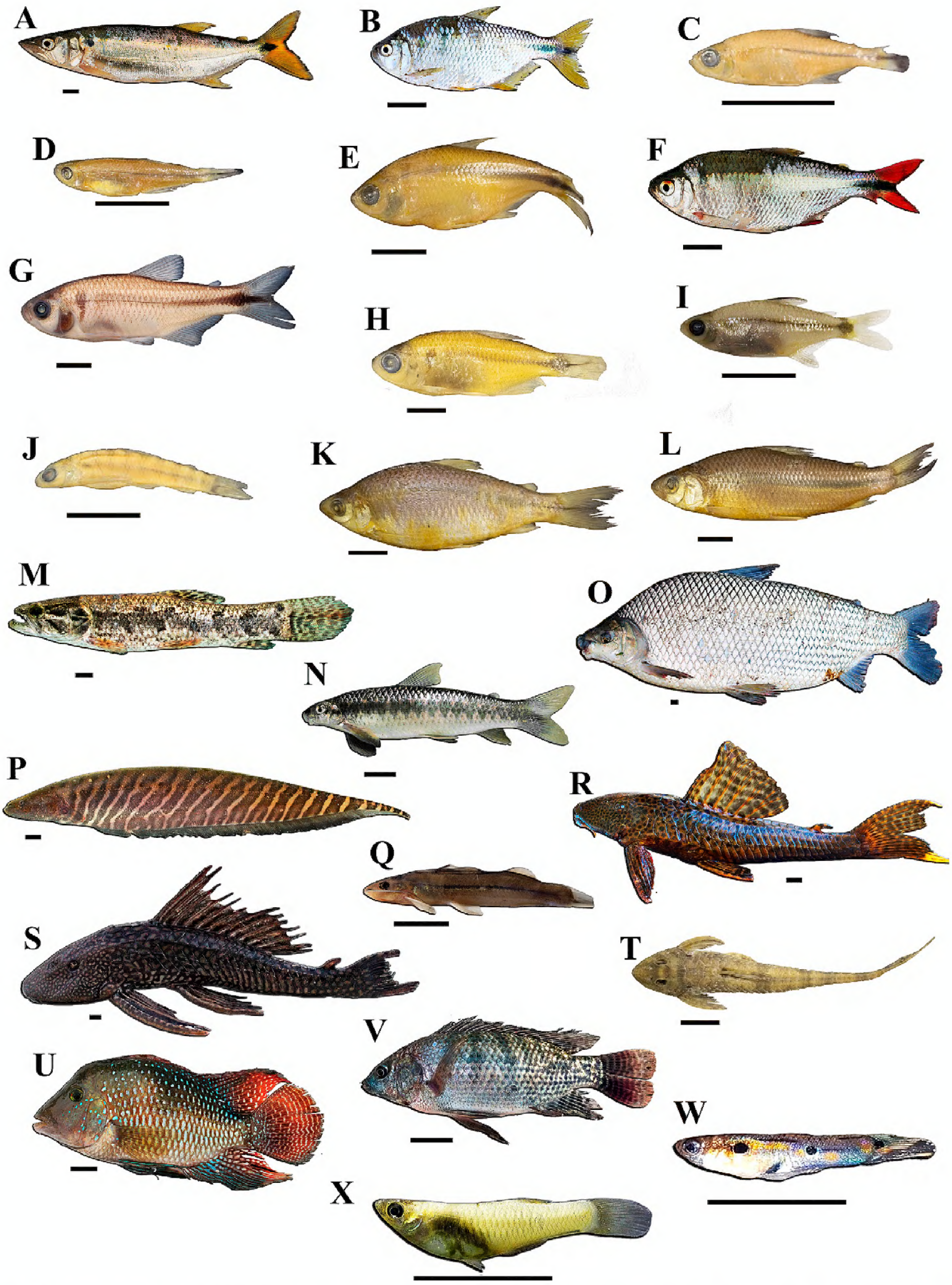

Figure 2. Species recorded in the Ipanema National Forest. **A.** *Acestrorhynchus lacustris* (180 mm), MZUSP 115236. **B.** *Astyanax lacustris* (100 mm), LEEF 1115167. **C.** *Hemigrammus marginatus* (18 mm), LEEF 115131. **D.** *Planaltina britskii* (25 mm), LEEF 121112. **E.** *Psalidodon bockmanni* (65 mm), LEEF 121112. **F.** *Psalidodon fasciatus* (75 mm), LEEF 13013. **G.** *Psalidodon paranae* (80 mm), LEEF 115136. **H.** *Psalidodon* cf. *schubarti* (75 mm), LEEF 130930. **I.** *Serrapinus notomelas* (2 cm). **J.** *Characidium zebra* (25 mm), LEEF 115145. **K.** *Cyphocarax gillii* (100 mm), LEEF 140731. **L.** *Steindachnerina insculpta* (86 mm), MZUSP 115238. **M.** *Hoplias malabaricus* (152 mm), LEEF 115143. **N.** *Parodon nasus* (90 mm), LEEF 115130. **O.** *Prochilodus lineatus* (29 cm), MZUSP 115270. **P.** *Gymnotus carapo* (180 mm), LEEF 115128. **Q.** *Pimellodela meeki* (55 mm), LEEF 115143. **R.** *Hypostomus ancistroides* (161 mm), LEEF 115146. **S.** *Pterygoplichthys ambrosettii* (185 mm), LEEF 151581. **T.** *Rineloricaria latirostris* (70 mm), LEEF 115127. **U.** *Geophagus brasiliensis* (135 mm), LEEF 115137. **V.** *Coptodon rendalli* (122 mm), MZUSP 115233. **W.** *Poecilia reticulata* (20 mm), LEEF 130929. **X.** *Phalloceros harpagos* (18 mm), LEEF 120804-1. Scale bars = 100mm.

W.S. Smith and L. Halcsik leg.; cast nets; LEEF 121114 (4 spec., 44.0–67.0 mm SL).

Identification. Body deep; premaxillary teeth in two rows, inner row with five penta- to heptacuspidate teeth, outer row with two tricuspidate teeth; one tricuspidate tooth on maxilla; dentary with four or five anterior most teeth larger, tri- to pentacuspidate; mouth terminal; lateral line incomplete (Reia et al. 2020).

***Psalidodon bockmanni* (Vari & Castro, 2007)**
Figure 2E

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°25.38′S, 047°28.36′W; 560 m alt.; 15.VI.2016; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 121112 (5 spec., 45.0–65.0 mm SL).

Identification. Body deep; mouth terminal; inner row of premaxilla with 5 teeth, outer with 4 or 5, dentary with 9–10, and maxilla with 2 teeth. Lateral line complete with 36 or 38 pored scales; transversal series above lateral line with 4 or 4½ scale rows and below with 3 or 3½ scale rows. Dorsal fin with 10, pectoral fin with 15 or 16, pelvic fin with 9, anal fin with 17–23 and caudal fin with 21, total rays. Ground color silvery; dark vertically elongated humeral blotch followed by another similar dark humeral blotch, smaller than the first (Graça and Pavanelli 2007; Ota et al. 2018).

***Psalidodon fasciatus* (Cuvier, 1819)**
Figure 2F

Material examined. BRAZIL – **São Paulo** • Iperó, Ferro Stream, 23°26.23′S, 047°37.51′W, 680 m alt.; 08.II.2016; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 13013 (25 spec., 40.0–80.5 mm SL).

Identification. Body elongated; mouth terminal; inner row of premaxilla with 5 teeth, outer with 4 or 5, dentary with 8–13, and maxilla with one tooth. Lateral line complete with 34–36 pored scales; transverse series above lateral line with 5 or 5½ scale rows and below with 5 scale rows. Dorsal fin with 11 rays, pectoral fin with 15, pelvic fin with 9, anal fin with 24–28, and caudal fin with 19 rays. Ground color silvery; black vertically elongated humeral blotch; Reddish unpaired fins reddish and paired fins hyaline (Graça and Pavanelli 2007; Ota et al. 2018).

***Psalidodon paranae* (Eigenmann, 1914)**
Figure 2G

Material examined. BRAZIL – **São Paulo** • Iperó, Ferro Stream, 23°25.53′S, 047°37.20′W; 680 m alt.; 07.VII.2017; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 115136, LEEF 115149 (8 spec., 35.0–90.0 mm SL).

Identification. Body elongated; mouth terminal; inner row of premaxilla with 5 teeth, outer with 4 or 5, dentary with 8–13, and maxilla with 1 tooth. Lateral line complete with 38 or 39 pored scales; transversal series above lateral line with 5 or 5½ scale rows and below with 4½ or 5 scale rows. Dorsal fin with 8 rays, pectoral fin with 10 or 12 rays, pelvic fin with 7, anal fin with 19–21 and caudal fin with 19 rays. Ground color silvery; black vertically elongated humeral blotch followed by another similar black humeral blotch, smaller than the first. Fins reddish (Graça and Pavanelli 2007 ; Ota et al. 2018).

***Psalidodon schubarti* (Britski, 1964)**
Figure 2H

Material examined. BRAZIL – **São Paulo** • Iperó, Ferro Stream, 23°25.53′S, 047°37.20′W; 680 m alt.; 08.II.2016; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 130930 (7 spec., 43.0–75.0 mm SL).

Identification. Body deep; mouth terminal; inner row of premaxilla with 5 teeth, outer with 3-5, dentary with 10–13, and one maxillary teeth. Lateral line complete, with 31–33 pored scales; transversal series above lateral line with 5–5½ scale rows and below with 4–4½ scale rows. Dorsal fin with 8 rays, pectoral fin with 9 or 11 rays, pelvic fin with 8, anal fin with 15–17, and caudal fin with 20 rays. Ground color pale yellow; dark –brown longitudinal stripe, along middle of body, from humeral spot to median caudal-fin rays; dark-brown humeral spot, transversely elongate. Dorsal and caudal fins yellowish, other fins hyaline (Graça and Pavanelli 2007; Ota et al. 2018).

Family Crenuchidae

***Characidium zebra* Eigenmann, 1909**
Figure 2J

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt.; 10.I.2014; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 115145, LEEF 115164 (3 spec., 21.0–23.0 mm SL).

Identification. Body elongated; mouth terminal; premaxilla with 9 teeth, dentary with 10 or 11 teeth and no maxillary teeth. Lateral line with 32–36 pored scales; transversal series above lateral line with 4½ or 5 scale rows and below with 4 or 4½ scale rows. Dorsal fin with 7 rays, pectoral fin with 14 or 16, pelvic fin with 10, anal fin with 5–7 rays, and caudal fin with 19 rays. Ground color pale yellow; dark-brown longitudinal stripe from humeral spot to caudal peduncle; 8–10 dark brown transversal bars on flank; black spot on the base of median caudal-fin rays; hyaline fins (Batista-Silva et al. 2018).

Family Curimatidae

***Cyphocharax gillii* (Eigenmann & Kennedy 1903)**
Figure 2K

Material examined. BRAZIL – **São Paulo** • Iperó, Hedberg Dam; 23°25.32′S, 047°35.41′W; 550 m alt.; 15.VI.2015; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 140731 (6 spec., 150.0–170.0 mm SL).

Identification. Body moderately elongate; mouth terminal; premaxilla, dentary and maxilla without teeth. Pored lateral-line scales from supracleithrum to hypural joint 28–33; 2–4 series of pored scales extending beyond hypural joint onto caudal-fin base; color silvery, with a dark spot obvious on the midlateral surface of caudal

peduncle patch of dark pigmentation on midlateral surface of caudal peduncle rotund, not continued anteriorly as thin midlateral stripe (Vari 1992).

***Cyphocharax modestus* (Fernández-Yépez, 1948)**

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River; 23°26.35′S, 047°35.28′W; 570 m alt., 13.VI.2017; W.S. Smith and L. Halcsik leg.; cast nets; MZUSP 115235 (7 spec., 155.0–180.0 mm SL).

Identification. Body deep; mouth terminal; premaxilla, dentary and maxilla without teeth. Lateral line with 35–37 pored scales; transversal series above lateral line with 6–6½ scale rows and below with 5–6½ scale rows. Dorsal fin with 10 rays, pectoral fin with 10–12, pelvic fin with 10, anal fin with 8–11 and caudal fin with 21 rays. Ground color silvery; dark brown inconspicuous longitudinal band along lateral line to distal margin of median caudal-fin rays, larger on caudal peduncle; hyaline fins (Batista-Silva et al. 2018).

***Steindachnerina insculpta* (Fernández-Yépez, 1948)**

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt.; 12.I.2012; W.S. Smith and L. Halcsik leg.; hand nets; MZUSP 115238 (6 spec., 80.0–90.0 mm SL).

Identification. Body deep; mouth terminal; premaxilla, dentary, and maxilla without teeth; lateral line with 33–35 pored scales; transversal series above lateral line with 5–5½ scale rows and below with 4½–5½. Dorsal fin with 10 rays, pectoral fin with 12–14, pelvic fin with 13 rays, anal fin with 12–14, and caudal fin with 21 rays. Ground color silvery; black conspicuous longitudinal stripe along lateral line to distal margin of median caudal-fin rays, larger on caudal peduncle; yellowish fins; dorsal-fin black blotch on the base of median rays, sometimes little conspicuous (Batista-Silva et al. 2018).

Family Erythrinidae

***Hoplias malabaricus* (Block, 1794)**

Figure 2M

Material examined. BRAZIL – **São Paulo** • Iperó, Administração Lagoon; 23°25.46′S, 047°36.02′W; 560 m alt.; 08.II.2016; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 115143, LEEF 115168 (12 spec., 190.0–230.0 mm SL).

Identification. Body elongated; mouth terminal; premaxillary with a row of teeth conical or tricuspid teeth in the maxilla; absence of frontal fontanelle and adipose fin; maxillary bone with conical and canine teeth; upper portion of the operculum without conspicuous black spot (Castro et al. 2004).

Family Parodontidae

***Apareiodon piracicabae* (Eigenmann, 1907)**

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River; 23°26.35′S, 047°35.28′W; 570 m alt; 13.VI.2017; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 115160 (5 spec., 65.0–90.0 mm SL).

Identification. Body elongated; mouth subterminal; premaxilla with 4 teeth, maxilla with 1 or 2 and dentary with no teeth; dorsal fin with 10–13 rays, pectoral fin with 11–14 rays, pelvic fin with 7–9, anal fin with 7 or 8 and caudal fin with 18 or 19 rays (Graça and Pavanelli 2007).

***Parodon nasus* Kner, 1859**

Figure 2N

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°25.38′S, 047°28.36′W; 560 m alt; 12.II.2012; W.S. Smith and L. Halcsik leg.; trawl nets; LEEF 115130 (11 spec., 65.0–100.0 mm SL).

Identification. Body elongated; teeth on the sides of the jaws; jaw with 2 or 3 posterior teeth; mouth subterminal; premaxilla with 4, dentary with 2–4 and maxilla with 2 teeth; from opercle to median caudal-fin rays, black longitudinal band with projections conferring "zigzag" (Graça and Pavanelli 2007).

Family Prochilodontidae

***Prochilodus lineatus* (Valenciennes, 1837)**

Figure 2O

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt; 15.VI.2015; W.S. Smith and L. Halcsik leg.; trawl nets; MZUSP 115270 (14 spec., 180.0–350.0 mm SL).

Identification. Body deep; thick and mobile lips, with several series of denticles; lateral line complete, with 44–50 pored scales; Dorsal fin pale grey; pelvic fin reddish-yellow (Graça and Pavanelli 2007).

Order Gymnotiformes
Family Gymnotidae

***Gymnotus carapo* Linnaeus, 1758**

Figure 2P

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River; 23°26.35′S, 047°35.28′W; 570 m alt; 10.I.2014; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 115128, LEEF 115141 (4 spec., 120.0–185.0 mm SL).

Identification. Body elongated; absent dorsal and ventral fins; banded stripes; well 2–7 teeth in the most anterior portion of dentary, shaped like an arrowhead; transparent area in the later 10–20% of the anal fin membrane (Ota et al. 2018).

Order Siluriformes
Family Callichthyidae

***Corydoras flaveolus* Ihering, 1911**

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt; 10.II.2012, W.S. Smith and L. Halcsik leg.; hand nets; MZUSP 115227 (4 spec., 35.0–65.0 mm SL).

Identification. Body deep and elliptical; mouth inferior; 22 plates along the body; dorsal fin with 8 rays, pectoral

fin with 10 or 12 rays, pelvic fin with 7, anal fin with 5–8 and caudal fin with 20 rays. Beige body color; absence of a humeral spot, brown spots and spots along the body (Thereza 2018).

Family Heptapteridae

***Imparfinis mirini* Haseman 1911**

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River; 23°26.35′S, 047°35.28′W; 570 m alt; 10.II.2012; W.S. Smith and L. Halcsik leg.; trawl nets; MZUSP 115244 (5 spec., 65.0–90.0 mm SL).

Identification. Body elongated; mouth terminal; premaxilla and dentary with several small and villiform teeth. Dorsal fin with 6 rays, pectoral fin with 11 or 12, pelvic fin with 7 and anal fin with 11–14 rays. First dorsal fin ray shorter than the second one; adipose-fin base short, not extending to caudal fin. Ground color beige; few scattered dark browns on body, except on ventral region of head and abdomen; dark brown transversal bars on dorsum; dark brown conspicuous longitudinal stripe along lateral line; yellowish or hyaline fins (Batista-Silva et al. 2018).

***Pimelodella meeki* Eigenmann, 1910**

Figure 2Q

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River; 23°26.35′S, 047°35.28′W; 570 m alt; 13.VI.2017; W.S. Smith and L. Halcsik leg.; trawl nets; LEEF 115143, LEEF 115168 (6 spec., 50.0–60.0 mm SL).

Identification. Body elongated; mouth terminal; premaxilla and dentary with several small and villiform teeth. Dorsal fin with I,7 rays; pectoral fin with I,10 or 12 rays; pelvic fin with 10 and anal fin with 5–7 rays. Light brown coloration, with a dark stripe along midline of body. First ray of the dorsal and pectoral fins transformed into a pungent thorn (Marceniuk et al. 2011).

Family Trichomycteridae

***Paravandellia oxyptera* Miranda Ribeiro, 1912**

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt; 12.I.2012; W.S. Smith and L. Halcsik leg.; hand nets; spec., LEEF 115174 (3 spec., 9.0–10.0 mm SL).

Identification. Body elongated; mouth inferior; premaxilla and dentary with several small teeth, sometimes covered by skin. Dorsal fin with 9 rays, pectoral fin with 7 rays, pelvic fin with 5–7 and anal fin with 9–10 rays. Ground color whitish to pale yellow; dark-brown longitudinal band, from operculum to vertical through pelvic-fin origin. Hyaline fin. Presence of interopercular and opercular odontodes. (Graça and Pavanelli 2007; Ota et al. 2018).

Family Loricariidae

***Hisonotus depressicauda* (Miranda Ribeiro, 1918)**

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt; 15.VI.2015; W.S. Smith and L. Halcsik leg.; trawl nets; LEEF 115146, LEEF 115171 (7 spec., 20.0–44.0 mm SL).

Identification. Deep body; inferior mouth; Mid-dorsal series of plates truncated much later, plates exceeding the length of the fin back; Scapular bridge partially or totally exposed (not covered by skin); anterior and lateral margin of the muzzle covered with about five relatively large plaques, provided with spines (Yoshiada et al. 2016).

***Hypostomus ancistroides* (Ihering, 1911)**

Figure 2R

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt; 10.II.2012; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 115146, LEEF 115171 (18 spec., 80.0–190.0 mm SL).

Identification. Deep body; inferior mouth; teeth bifid; premaxilla with 24–33 teeth and dentary with 23–35 teeth. Mid-lateral series with 27 or 28 plates, pre-dorsal series with 3, and dorsal- fin base series with 8 or 9 plates. Dorsal fin with I,7 rays; pectoral fin with I,6; pelvic fin with i,5; and anal fin with 6 rays. Brown ground color; dark brown blotches on body, especially on the dorsal region; dark fins with dark brown spots (Batista-Silva et al. 2018).

***Hypostomus regani* (Ihering, 1905)**

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt; 08.II.2016; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 140732 (6 spec., 120.0–140.0 mm SL).

Identification. Body elongated; mouth ventral; body covered with odontodes and bone plates; abdomen partially covered by plates; small yellow spots on the head; fins dark with large light round spots (Reia et al. 2020).

***Hypostomus strigaticeps* (Regan, 1908)**

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°22.40′S, 049°38.51′W; 560 m alt; 10.II.2012; W.S. Smith and L. Halcsik leg.; trawl nets; LEEF 151581 (3 spec., 80.0–110.0 mm SL).

Identification. Body elongated; mouth ventral; mid-lateral series with 24–26, predorsal series with 3, and dorsal-fin base series with 8 plates (Ota et al. 2018).

***Pterygoplichthys ambrosettii* (Holmberg, 1893)**

Figure 2S

Material examined. BRAZIL – **São Paulo** • Iperó, Hedberg Dam; 23°25.40′S, 047°35.30′W; 550 m alt; 08.II.2016; Smith W.S. and Halcsik L.; cast nets; LEEF 151581 (9 spec., 120.0–190.0 mm SL).

Identification. Deep body; inferior mouth; 11–15 rays on the dorsal fin; light spots all over the body, especially in

the ventral region; body covered with plates (Ota et al. 2018).

***Rineloricaria latirostris* (Boulenger, 1900)**
Figure 2T

Material examined. BRAZIL – **São Paulo** • Iperó, Verde River; 23°26.35′S, 047°35.28′W; 570 m alt; 10.II.2012; W.S. Smith and L. Halcsik leg.; trawl nets; LEEF 115127 (4 spec., 60.0–750.0 mm SL).

Identification. Body depressed; mouth inferior; premaxilla and dentary with 5 teeth. Dorsal fin with I7 rays, pectoral fin with I6–8, pelvic fin with i6 and anal with 4–6 rays. Depressed caudal peduncle, forming one keel on each side (Castro et al. 2004).

Order Cichliformes
Family Cichlidae

***Geophagus brasiliensis* (Quoy & Gaimard, 1824)**
Figure 2U

Material examined. BRAZIL – **São Paulo** • Iperó, Limão lagoon; 23°25.27′S, 047°36.19′W; 610 m alt; 13.VI. 2017; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 115137, LEEF 115163 (8 spec., 80.0–250.0 mm SL).

Identification. Body deep; mouth terminal; premaxilla with 2 or 3 and dentary with 2–4 teeth rows. Upper lateral line with 17–19 pored scales, lower lateral line with 10–14 pored scales and longitudinal series with 28–30 scales. Transversal series above upper lateral with 4 and below lower lateral line with 7 scale rows. Dorsal fin with XVI–XVII, 10–13 rays, pectoral fin with 14 rays, pelvic fin with I,6 and anal fin with III, 10–12 rays. Ground color iridescent blue and green; dorsal, anal, caudal and pelvic fin are red with blue with iridescent blue dots aligned between rays and with pectoral fin yellowish hyaline; conspicuous dark-brown rounded blotch on flank (Graça and Pavanelli 2007; Ota et al. 2018).

***Oreochromis niloticus* (Linnaeus, 1758)**

Material examined. BRAZIL – **São Paulo** • Iperó, Limão lagoon; 23°25.27′S, 047°36.19′W; 610 m alt; 10.II. 2013; W.S. Smith and L. Halcsik leg.; cast nets; LEEF 140319 (12 spec., 40.0–190.0 mm SL).

Identification. Body deep; mouth terminal; premaxilla with 2 or 3 and dentary with 2–4 teeth rows. Upper lateral line with 17–19 pored scales, lower lateral line with 10–14 pored scales and longitudinal series with 28–30 scales. Transversal series above upper lateral with 4 and below lower lateral line with 7 scale rows. Dorsal fin with XVI–XVII, 10–13 rays, pectoral fin with 14 rays, pelvic fin with I,6 and anal fin with III, 10–12rays. Ground color iridescent green; conspicuous dark-brown rounded blotch on flank (Graça and Pavanelli 2007; Ota et al. 2018).

***Coptodon rendalli* (Boulenger, 1897)**
Figure 2V

Material examined. BRAZIL – **São Paulo** • Iperó, Cobra lagoon; 23°26.37′S, 047°38.20′W; 750 m alt; 10.II. 2012; W.S. Smith and L. Halcsik leg.; cast nets; MZUSP 115233 (6 spec., 70.0–180.0 mm SL).

Identification. Body deep; mouth terminal; small mouth; often appearing brownish with a white belly; dark bands along the body (Ota et al. 2018).

Order Cyprinodontiformes
Family Poeciliidae

***Phalloceros harpagos* Lucinda, 2008**
Figure 2X

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°25.38′S, 047°28.36′W; 560 m alt; 08.II.2016; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 120804-1 (18 spec., 10.0–25.0 mm SL).

Identification. Body elongated; mouth superior, dentary prognathous; premaxilla and dentary with several small teeth. Longitudinal series with 28–32 scales and transverse series with 7–9 scale rows; dorsal fin with 7 rays, pectoral fin with 11–13 rays, pelvic with 5 and anal fin with 10–12 rays (female) or 8–10 rays (male). Ground color yellowish brown; dark-brown lateral spot, vertically elongated; scales with dark-brown border, conferring reticulate pattern to body (Ota et al. 2018).

***Poecilia reticulata* Peters, 1859**
Figure 2W

Material examined. BRAZIL – **São Paulo** • Iperó, Ipanema River; 23°25.38′S, 047°28.36′W; 560 m; 08.II. 2016; W.S. Smith and L. Halcsik leg.; hand nets; LEEF 130929 (22 spec., 10.0–28.0 mm).

Identification. Body elongated; mouth superior, dentary prognathous; premaxilla and dentary with several small teeth. Longitudinal series with 22–24 scales and transverse series with 8 or 9 scale rows; dorsal fin with 8 or 9 rays, pectoral fin with 13, pelvic with 6 and anal fin with 8 rays. Ground color pale yellow; scales with dark-brown border, conferring reticulate pattern to body; males with several black or colored spots and irregular stripes (Graça and Pavanelli 2007; Ota et al. 2018).

Discussion

The predominance of the orders Characiformes, Siluriformes, Gymnotiformes, and Cichliformes was expected as they have greatest number of species in the Neotropical Region (Lowe-McConell 1987; Castro and Menezes 1998; Reis et al. 2003; Winemiller et al. 2008). Most of the species in Ipanema National Forest are native, small, and dependent on sources of allochthonous material from riparian vegetation, or they are endemic to the Alto Paraná and the Sorocaba and Middle Tietê river basins (Smith et al. 2013). Although only three species are Endangered, the presence of a diverse fish fauna in the Ipanema National Forest is indicative of the importance of this conservation unit. Ipanema National Forest is one of the most important sites for the conservation of

the fish fauna of the Sorocaba river basin. *Prochilodus vimboides*, *Pseudopimelodus mangurus* (Valenciennes, 1835), and *Bunocephalus larai* (Ihering, 1930) have been assessed as Vulnerable in the state of São Paulo (Oyakawa *et al*. 2010). Two rare species, *Tatia neivai* (Ihering, 1930) and *Bunocephalus larai*, have already been recorded in the Ipanema River.

The species *P. vimboides* was not captured during this work. Currently, in addition to being rare in the literature, the catch records of *P. vimboides* are also scarce (Vieira and Rodrigues 2010; Marques et al. 2013). According to Polaz et al. (2011), there was a large catch of approximately 15 tons of curimbatás, in 1952 in the Paraíba valley region (mainly in the Paraíba do Sul River); the species was probably *P. vimboides*. Honji et al. (2017) mentioned that *P. vimboides* is present in the Estação de Hidrobiologia e Aquicultura de Paraibuna of CESP and Piabanha Project (NGO Piabanha Project), two conservation units in a tributary of the Paraíba do Sul River.

We noticed that *P. vimboides* is replaced by its congener, *Prochilodus lineatus*. Possibly, the process of substituting one species for another is due to its lower biotic potential and may also be associated with environmental changes. This explains the increasingly rare records of *P. vimboides* and the more abundant *P. lineatus* (Polaz et al. 2011). Honji et al. (2017) highlighted two threats to *P. vimboides*. Most severe is the construction of dams and reservoirs. As a rheophilic species, the genus *Prochilodus* needs to migrate to reproduce, and with the rivers blocked, it is not possible to complete the migration process. The second threat is the presence of introduced species, which is currently one of the largest threats to global biodiversity (Moraes et al. 2017).

The presence of *Psalidodon paranae* (previously identified as *Astyanax scabripinnis*), a species typically found in streams (Castro and Casatti 1997) was found in the Ribeirão do Ferro. This species is widely distributed in headwaters, indicating its preference for small streams. According Oyakawa et al. (2006), knowledge on the species diversity in headwaters is lacking and headwater fish species are in general small and uninteresting for fishing, habitats are cryptic, and aquatic environments are quite restricted. Oyakawa et al. also highlight the difficulty in sampling all species at the headwaters of rivers.

Among all the species found, only *Phalloceros harpagos* Lucinda, 2008 was found in all collecting sites, which can be attributed to this species' successful adaptation to the different habitat types in quieter waters (Mazzoni et al. 2011). The predominant species at our sampling sites are native and non-threatened species, as is expected for Neotropical hydrographic basins and in São Paulo state. These small, Neotropical species depend on the marginal vegetation (Oyakawa and Menezes 2011).

Several species were introduced over time, such as the *Coptodon rendalli*, *Piaractus mesopotamicus* (Holmberg, 1887), *Brycon amazonicus* (Agassiz, 1829), and *Cyprinus carpio* Linnaeus, 1758 (Smith 2003), which have contributed to the decreased stability of this fish community. Several species have been introduced over time, such as *Coptodon rendalli*, *Piaractus mesopotamicus* (Holmberg, 1887), *Brycon amazonicus* (Agassiz, 1829) and *Cyprinus carpio* Linnaeus, 1758 (Smith 2003). Aquatic environments in conservation areas, although legally protected, can still have species introduced outside the basin, since aquatic systems tend to be connected with other subsystems (Agostinho et al. 2006).

Acknowledgements

We thank the Chico Mendes Institute (ICMBio) for the sampling licenses and for logistical support, the Vice-Reitoria de Pós-Graduação e Pesquisa da Universidade Paulista for logistical support. We are grateful to Professor Francisco Langeani Neto (Universidade Estadual Paulista, São José do Rio Preto) and Oswaldo Takeshi Oyakawa for the curatorial assistance and help in the identification of species. We also thank the reviewers and editors of this journal for their contributions.

Authors' Contributions

LH, WSS, and RCB collected the data and identified specimens. WSS, RCB, LASP, and MSS took photographs and wrote the text. All authors analyzed the data.

References

Agostinho A.A, Pelicice, FM, Júlio JR, H.F (2006) Biodiversidade e introdução de espécies de peixes: unidades de conservação. Unidades de conservação: ações para valorização da biodiversidade Instituto Ambiental do Paraná, Curitiba, Brazil, 95–117.

Cardone IB, Lima-Junior SE, Goitein R (2006) Diet and capture of *Hypostomus strigaticeps* (Siluriformes, Loricariidae) in a small Brazilian stream: relationship with limnological aspects. Brazilian Journal of Biology 66 (1A): 25–33.

Castro RMC, Casatti L (1997) The fish fauna from a small forest stream of the upper Paraná river basin, southeastern Brazil. Ichthyological Explorations of Freshwaters 7 (4): 337–352.

Castro, RMC, Menezes NA (1998) Estudo diagnóstico da diversidade de peixes do Estado de São Paulo. In: Castro RMC (Ed.) Biodiversidade do estado de São Paulo, Brasil: síntese do conhecimento ao final do século XX, vol. 6, vertebrados. Winnergraph-FAPESP, São Paulo, Brazil, 1–13.

Castro R, Casatti L, Santos HF, Melo AL, Martins LS, Ferreira K M, Langeani F (2004). Estrutura e composição da ictiofauna de riachos da bacia do rio Grande no estado de São Paulo, sudeste do Brasil. Biota Neotropica 4 (1): 1–39.

Cetra, M, Sarmento-Soares, L M, Martins-Pinheiro, RF (2010) Peixes de riachos e novas Unidades de Conservação no sul da Bahia. Pan-American Journal of Aquatic Sciences 5(1): 11–21.

Casarim, R, Caldeira, Y M, Pompeu, PS (2020) Representativeness of national parks in protecting freshwater biodiversity: a case of Brazilian savanna. Ecology of Freshwater Fish 29 (4): 705–721. https://doi.org/10.1111/eff.12547

Expedição Langsdorff ao Brasil. 1821–1829 (1988) Rio de Janeiro, Edições Alumbramento Vol. 1, Aquarelas e Desenhos de Rugendas, 154 pp, Vol. 2, Aquarelas e Desenhos de Taunay, 159 pp, Vol. 3, Aquarelas e Desenhos de Florence, 134 pp.

Graça WJ, Pavanelli CS (2007) Peixes da planície de inundação do

alto rio Paraná e áreas adjacentes. Eduem, Maringá, Brazil, 241 pp.

Honji RM, Tolussi CE, Caneppele D, Polaz CNM, Hilsdorf AWS, Moreira RG (2017) Biodiversidade e conservação da ictiofauna ameaçada de extinção da bacia do rio Paraíba do Sul. Revista da Biologia 17 (2): 18–30. https://doi.org/10.7594/revbio.17.02.05

Junior GAV, Gomiero, LM, Goitein R (2008). Alimentação de *Serrasalmus maculatus* (Kner, 1858) (Characiformes; Serrasalmidae) no trecho inferior bacia do rio Sorocaba, São Paulo, Brasil. Acta Scientiarum. Biological Sciences 3 0(3): 267–273.

Latini AO, Resende DC, Pombo, VB, Coradin L (2016). Espécies exóticas invasoras de águas continentais no Brasil. Ministério do Meio Ambiente, Brazil, 791 pp.

Lowe-Mcconnell RHL (1987) Ecological studies in tropical fish communities. Cambridge University Press, Cambridge, UK, 382 pp.

Marçal AS (2009) Composição, estrutura e fatores determinantes da ictiofauna de um reservatório neotropical: Cachoeira Dourada, Brasil. PhD thesis, Universidade Federal de São Carlos, São Paulo, Brazil, 89 pp.

Marceniuk AP, Hilsdorf AWS, Langeani F (2011) The ichthyofauna from the headwaters of the rio Tietê, São Paulo, Brazil. Biota Neotropica 11 (3): 217–236.

Marques BS, Belei F, Sampaio WMS (2013) Ictiofauna do baixo rio Manhuaçu (bacia do médio rio Doce). Evolução e Conservação da Biodiversidade 4 (1): 32–41. https://doi.org/10.7902/ecb.v4i1.63

Menezes, NA, Weitzman S, Oyakawa OT, Lima F, Castro R, Weitzman M (2007) Peixes de água doce da mata atlântica. Museu de Zoologia/USP, Conservação Internacional, FAPESP & CNPq, São Paulo, Brazil, 407 pp.

Meschiatti A J, Arcifa MS (2009) A review on the fishfauna of Mogi-Guaçu river basin: a century of studies, Acta Limnologica Brasiliensia 21 (1): 135–159.

MMA Ministério do Meio Ambiente (2003) Plano de Manejo da Floresta Nacional de Ipanema. http://www.icmbio.gov.br/portal/images/stories/imgsunidadescoservacao/flona_ipanema.pdf. Accessed on: 2020-10-05.

Moraes M B, Polaz CNM, Caramaschi EP, dos Santos Júnior S, Souza G, Carvalho FL (2017) Espécies exóticas e alóctones da bacia do Rio Paraíba do Sul: implicações para a conservação. BioBrasil 1: 34–54.

Oliveira AK, Apone FB, Birindelli JLOC, Garavello JC (2013) Fish assemblage structure of the Ipanema River, a small lotic environment partially protected by a Conservation Unit in southeastern Brazil. Brazilian Journal of Biology 73 (2): 259–270. https://doi.org/10.1590/S1519-69842013000200006

Ota RR, Deprá GDC, Graça WJD, Pavanelli CS (2018) Peixes da planície de inundação do alto rio Paraná e áreas adjacentes: revised, annotated and updated. Neotropical Ichthyology 16 (2): 10–15.

Oyakawa OT, Akama A, Mautari KC, Nolasco JC (2006) Peixes de riachos da Mata Atlântica nas Unidades de Conservação do Vale do Rio Ribeira de Iguape no estado de São Paulo. Editora Neotropica. São Paulo, Brazil, 201 pp.

Oyakawa OT, Menezes NA (2011) Checklist dos peixes de água doce do Estado de São Paulo, Brazil. Biota Neotropical 11 (1a): 1–13. https://doi.org/10.1590/S1676-06032011000500002

Oyakawa OT, Menezes NA, Shibatta OA, Lima FCT, Langeani F, Pavanelli CS, Nielsen DTB, Hilsdorf AWS (2009) Peixes de água doce. In: Bressan PM, Kierulff MCM, Sugieda AM (Eds.) Fauna ameaçada de extinção no Estado de São Paulo: vertebrados. Fundação Parque Zoológico de São Paulo, Secretaria do Meio Ambiente, São Paulo, Brazil, 349–424.

Polaz CNM, Bataus YSL, Desbiez A, Reis M L (2011) Plano de ação nacional para a conservação das espécies aquáticas ameaçadas de extinção da Bacia do Rio Paraíba do Sul. Série Espécies Ameaçadas (16): 35.

Reia L, Costa e Silva GS, Ayala JG, Vicensotto AMPF, Benine RC (2020) Ichthyofauna of the ribeirão Sucuri, a tributary of the rio Tietê, upper rio Paraná basin, southeastern Brazil. Check List 16 (3): 711–728. https://doi.org/10.15560/16.3.711

Resende E K, de Salis SM, Ishii, I Santos R, de Moura H C G, Monaco IDA, da Silva LW (2016) Relatório técnico: pulso de inundação, diversidade e biologia dos peixes na Baía do Tuiuiú, Pantanal Sul. Embrapa Pantanal-Documentos, Corumbá, Mato Grosso do Sul, 28–30 pp.

Salazar JM (1998) Araçoiaba and Ipanema: a história daquela maravilhosa região, desde as forjas de Afonso Sardinha até a Real Fábrica de Ferro. Digipel, Sorocaba, Brazil, 120 pp.

Shibatta OA, Orsi ML, Bennemann ST, Silva-Souza AT (2002). Diversidade e distribuição de peixes na bacia do rio Tibagi. In: Medri ME, Bianchini E, Shibatta OA, Pimenta JA (Eds.) A bacia do rio Tibagi. Iheringia, Londrina, Brazil, 403–423.

Smith WS (1999) Pesque-pague: uma ameaça à ictiofauna nativa? PUC-SP Ciências Biológicas Ambientais 3(1): 313–319.

Smith WS, Marciano FT (2000) A ictiofauna da Floresta Nacional de Ipanema - Iperó, São Paulo, como base para ações de manejo, conservação e educação ambiental. II Congresso Brasileiro de Unidades de Conservação, Campo Grande, Brazil, 409–417.

Smith WS (2003) Os peixes do rio Sorocaba: a história de uma bacia hidrográfica. Editora TCM Sorocaba, Brazil, 163 pp.

Smith WS, Petrere Jr M, Barrella W (2007) Fish, Sorocaba river sub-basin, state of São Paulo, Brazil. Check List 3 (3): 282–286. https://doi.org/10.15560/3.3.282.

Smith WS, Regalado, LB (2008) Floresta Nacional de Ipanema. Ciência Hoje 43 (255): 70–73.

Smith WS, Petrere Jr M, Barrella W (2009) The fish community of the Sorocaba river basin in different habitats (state of São Paulo, Brazil). Brazilian Journal of Biology 69 (4): 1015–1025 https://doi.org/10.1590/S1519-69842009000500005

Smith WS, RC Biagioni, L Halcsik (2013) Fish fauna of Floresta Nacional de Ipanema, São Paulo state, Brazil, Biota Neotropica 13 (2): 175–181 https://doi.org/10.1590/S1676-06032013000200016

Tatsumi, F. L. (2006). Revisão taxonômica de *Bryconamericus iheringii* (Boulenger, 1887) (Characiformes, Characidae). Master's thesis, Universidade Estadual Paulista, São José do Rio Preto, Brazil, 110 pp.

Thereza MR (2018). Guia de identificação dos peixes Siluriformes (Teleostei: Ostariophysi) da bacia do rio Grande, Alto rio Paraná. Master's thesis, Universidade Estadual Paulista, São José do Rio Preto, Brazil, 105 pp.

Vieira F, Rodrigues RR (2010) A fauna de peixes dos afluentes do rio Paraíba do Sul no estado de Minas Gerais. MG.BIOTA 3 (1): 5–23.

Yoshida CE, Rolla APPR, Uieda VS, Esteves KE (2008) Chave de identificação dos peixes de riachos da Serra do Japi (Apas Jundiaí-Cabreúva/SP). Boletim do Instituto de Pesca 42 (4): 800–815.